

WHAT IS CLAIMED IS:

1 1. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal portion, a distal portion, and a lumen therethrough; (b) a  
3 drive cable rotatably received in the lumen; and (c) a hub assembly secured to a proximal  
4 end of the drive cable, wherein the improvement comprises a rotary transformer disposed  
5 within the hub assembly, the rotary transformer including a first ferrite core and a second  
6 ferrite core, the second ferrite core contacting the first ferrite core with substantially zero  
7 clearance therebetween to promote electrical induction between each core.

1 2. The improved catheter system of claim 1, wherein the first ferrite  
2 core is stationary, and wherein the second ferrite core is rotatable.

1 3. The improved catheter system of claim 2, wherein the rotary  
2 transformer further comprises a friction limiting material disposed between the rotating  
3 ferrite core and the fixed ferrite core.

1 4. The improved catheter system of claim 1, wherein the first ferrite  
2 core is biased against the second ferrite core.

1 5. The improved catheter system of claim 1, wherein the first ferrite  
2 core is free floating within the hub assembly.

1 6. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal portion, a distal portion, and a primary lumen  
3 therethrough; and (b) a drive cable having a cable body and a cable lumen rotatably  
4 received in the lumen, having at least one lead wire disposed in the cable lumen, wherein  
5 the improvement comprises a support member disposed within the cable lumen to provide  
6 strain relief to the lead wire when the lead wire is subjected to a tensile load, the support  
7 member extending substantially the entire length of the lead wire.

1 7. The improved catheter system of claim 6, wherein the support  
2 member comprises a flexible multi-filament material.

1 8. The improved catheter system of claim 6, wherein the support  
2 member comprises Kevlar®.

1 9. The improved catheter system of claim 6, wherein the support  
2 member comprises a liquid crystal polymer.

1 10. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal portion, a distal portion, and a primary lumen  
3 therethrough; and (b) a drive cable having a cable body and a cable lumen rotatably  
4 received in the primary lumen, having at least one lead wire disposed in the cable lumen,  
5 wherein the improvement comprises a strain relief device coupled to a portion of the drive  
6 cable, the strain relief device allowing the lead wire to move within the cable lumen when  
7 placed in tension.

1 11. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal tubular portion, a distal tubular portion, and a lumen  
3 therethrough, and (b) a drive cable rotatably received in the lumen, wherein the  
4 improvement comprises an intermediate tubular portion formed on the tubular catheter  
5 body of a transitional material between the proximal tubular portion and the distal tubular  
6 portion, the transitional material being of a higher flexural modulus than the distal tubular  
7 portion and of a lower flexural modulus than the proximal tubular portion.

Sub 12. The improved catheter system of claim 11, wherein the proximal  
2 tubular portion comprises a material taken from the group consisting of a natural or  
3 synthetic polymer or plastic material, such as silicone rubber, natural rubber,  
4 polyvinylchloride, polyurethanes, polyesters, polyethylene, polytetrafluoroethylene  
5 (PTFE), and polyetheretherketone (PEEK).

1 13. The improved catheter system of claim 11, wherein the  
2 intermediate tubular portion comprises a material taken from the group consisting of  
3 nylons, polyester, polyimides, polyolefins, and blends of such materials.

1 14. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal portion, a distal portion, and a primary lumen  
3 therethrough, (b) a guidewire lumen coupled coaxially with the primary lumen on the  
4 distal portion of the catheter, having a wedge in between said lumens; and (c) a drive  
5 cable rotatably received in the primary lumen, wherein the improvement comprises a

6 wedge lumen formed in the wedge allowing communication between the primary lumen  
7 and the guidewire lumen.

1 15. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal portion, a distal portion, and a lumen therethrough, and  
3 (b) a drive cable rotatably received in the lumen, wherein the improvement comprises the  
4 drive cable comprising a first inner coil, a second inner coil, and an outer coil, the outer  
5 coil being wound in a direction opposite to the inner coils, the first inner coil expanding  
6 against the outer coil and the second inner coil expanding against the first inner coil when  
7 the drive cable is rotated, thereby increasing the column strength of the drive cable.

1 16. The improved catheter system as in claim 15, wherein the outer  
2 coil contracts against the first inner coil when the drive cable is rotated.

1 17. An improved catheter system of the type including (a) a tubular  
2 catheter body having a proximal portion, a distal portion, and a lumen therethrough, and  
3 (b) a drive cable rotatably received in the lumen, wherein the improvement comprises a  
4 first tubular member and a second tubular member arranged in a telescoping engagement,  
5 wherein the first tubular member is formed at least in part from a material, the material  
6 being a plastic or a polymer material, such as polyetheretherketone (PEEK).

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